AMENDMENTS TO THE SPECIFICATION

Please replace the paragraph beginning at **page 32, line 18**, and insert the following rewritten paragraph:

Returning to Fig. 1, two ground contact sensors 24 and 25 are provided on the soles of the foot portions 14 of the legs 2 (specifically, on the bottom surfaces of the shoes attached to the foot portions 14). Of the ground contact sensors 24 and 25, the ground contact sensor 24 is provided at the location directly below the ankle joint 13 (heel) and the ground contact sensor ~~24~~ 25 is provided at the location directly below a metatarsophalangeal joint 14a of the foot 14 (the joint of the root of the thumb of the foot 14)(toe). These ground contact sensors 24 and 25 are sensors that output ON/OFF signals indicating whether the locations where they are installed are in contact with the ground. The detection outputs of the joint displacement sensors 21, 22 and 23, and the ground contact sensors 24 and 25 are supplied to the arithmetic processing unit 18 of the sensor box 15 through signal lines (not shown).

Please replace the paragraph beginning at **page 40, line 2**, and insert the following rewritten paragraph:

Further, in the rigid link model S1, the weight and the length (the length in the axial direction) of each rigid element and the position of the center-of-gravity of each rigid element (the position in each rigid element) are specified beforehand and

stored and retained in a memory, not shown, of the arithmetic processing unit 18. Black dots G8, G7, G6, G10, G12, and G14 shown in Fig. ~~3~~ 5 illustratively indicate the centers of gravity of the chest element S8, the abdomen element S7, the waist element S6, the thigh element S10, the crus element S12, and the foot element S14, respectively. The waist element S6 is shaped like an inverted T, as mentioned above, so that the length thereof is divided into the length of the portion S6a and the portion S6b mentioned above.

Please replace the paragraph beginning at **page 43, line 13**, and insert the following rewritten paragraph:

The leg plane PL for each of the legs 2 has a leg coordinate system LC fixed and set. In Fig. 5, for the sake of convenience, only the leg coordinate system LC corresponding to the leg plane PL of the leg portion S2 on the right side is representatively shown. The leg coordinate system LC is a three-dimensional coordinate system (XYZ coordinate system) in which the midpoint of the hip joint J9 on the leg plane PL is defined as its origin, the axis in the direction perpendicular to the leg plane PL is defined as Y axis, the axis in the direction parallel to the axis obtained by projecting the Z axis of the body coordinate system BC onto the leg plane PL is defined as Z axis, and the axis in the direction orthogonal to these Y axis and Z axis is defined as X axis. Incidentally, the XZ plane of the leg coordinate system ~~PL~~ LC agrees with the leg plane PL.

Please replace the paragraph beginning at **page 47, line 24**, and insert the following rewritten paragraph:

The arithmetic processing unit 18 is further provided with a floor reaction force estimating means 34 for estimating the value of a floor reaction force vector (translational floor reaction force) acting on the legs 2 and 2 of the human being 1 (the coordinate component value) in the body coordinate system BC by using the value of the position vector of each ankle joint J13 determined by the three-dimensional joint/element center-of-gravity position calculating means 30, the value of the position vector of the overall center-of-gravity determined by the overall center-of-gravity position calculating means ~~32~~<u>33</u>, the value of the acceleration vector of the origin of the body coordinate system BC determined by the body coordinate system acceleration/angular velocity calculating means 31, and the detection outputs of the ground contact sensors 24 and 25, and a floor reaction force acting point estimating means 35 for estimating the value of the position vector of the acting point of a floor reaction force vector (hereinafter referred to simply as the floor reaction force acting point) acting on the legs 2 in the body coordinate system BC by using the values of the position vectors of each ankle joint J13 and each MP joint J14a determined by the three-dimensional joint/element center-of-gravity position calculating means 30, the inclination angle of the body coordinate system BC determined by the body coordinate system inclination angle calculating means 32, the value of the position vector of the overall center-of-gravity determined by the overall center-of-gravity position calculating means 33, and the detection outputs of the ground contact sensors 24 and 25.

Please replace the paragraph beginning at **page 56, line 10**, and insert the following rewritten paragraph:

Specifically, as shown in Fig. 7, if detected rotational angles of the hip joint 9, the knee joint 11, and the ankle joint 13 (the rotational angles about axes perpendicular to the leg plane PL ~~(= XZ~~(XZ plane of the leg coordinate LC) from the aforesaid reference posture state) are denoted as θ_hip, θ_knee, and θ_ankle, then θ_thigh, θ_crus, and θ_foot are sequentially determined according to the following expressions (3a) to (3c), respectively.

Please replace the paragraph beginning at **page 59, line 27**, and insert the following rewritten paragraph:

The sets of X coordinate components and Z coordinate ~~system~~ components of the position vectors U(G_thigh/LC), U(G_crus/LC), and U(G_foot/LC) determined according to the above expressions (5a) to (5c) indicate two-dimensional positions on the leg plane PL. The arithmetic processing explained above is the arithmetic processing of the two-dimensional leg posture/element center-of-gravity position calculating means 29.

Please replace the paragraph beginning at **page 76, line 26**, and insert the following rewritten paragraph:

The meanings of these expressions (17) to (21) will be explained. Expression (17) denotes a dynamic equation related to a translational motion of the overall center-of-gravity G_overall in the body coordinate system BC, the right side thereof being the same as the right side of the aforesaid expression (16). Expressions (18) to (21) are geometric relational expressions obtained on the assumption that the floor reaction force vector Frf(right leg/BC) and the floor reaction force vector Frf(left leg/BC) are the vectors directed from the ankle joint 13 of the right leg 2 and the ankle joint 13 of the left leg 2 toward the overall center-of-gravity G_overall, that is, the floor reaction force vector Frf and the position vector of the G_overall observed from the left ankle joint 13 have the same direction. In this case, expressions (18) and (19) are relational expressions observed on a sagittal plane (the XZ plane of the body coordinate system BC), while expressions (20) and (21) are relational expressions observed on the frontal plane (YZ of the body coordinate system ~~BC) plane~~BC plane). In Fig. 10, for the sake of convenience, the Z axis of the body coordinate system BC is shown in the vertical direction; however, expressions (17) to (21) do not depend on the inclination of the body coordinate system BC. In the present embodiment, the ankle joint 13 of each leg 2 means a particular portion in the vicinity of the bottom end portion of the leg 2.

Please replace the paragraph beginning at **page 101, line 13**, and insert the following rewritten paragraph:

An explanation will now be given in conjunction with Fig. 17 to Fig. 20. Fig. 17 and Fig. 18 are graphs showing the average errors of the joint moments of the hip joint 9 and the knee joint 11 when the human being 1 walks straight (4.5 km/h) in a state wherein each leg 2 has been rotated from the aforesaid reference posture state by a plurality of different angles (1 deg, 2 deg, 3 deg, 4 deg and 5 deg in this example) in the direction of abduction (the direction in which the leg 2 is moved to a side of the human being 1) and in the direction of external rotation (the direction in which the leg 2 is moved about the axis of the thigh ~~10~~ 12 such that the leading edge of the foot 14 of the leg 2 faces outward) at the hip joint 9 thereof, and further, in a state wherein the leg 2 has been rotated from the aforesaid reference posture state by a plurality of different angles (the same as the angles of the abduction and external rotation of the hip joint 9 in this example) in the direction of external rotation (the direction in which the leg 2 is moved about the axis of the crus 10 such that the leading edge of the foot 14 of the leg 2 faces outward) at the knee joint 11 thereof. Here, Fig. 17 is a graph related to the joint moments of the hip joint 9 and Fig. 18 is a graph related to the joint moments of the knee joint 11, and they show the average values of differences between the joint moments determined by the technique in accordance with the present embodiment and the values actually measured, using a torque meter or the like, by solid lines (average errors). In this case, in Fig. 17 and Fig. 18, each leg 2 is turned in both directions of abduction and external rotation at the hip joint 9 by each angle on the axis of abscissas, and the leg 2 is also turned in

the direction of external rotation by the angle at the knee joint 11. When calculating the joint moments of the hip joint 9 and the knee joint 11, for the sake of convenience, the values of floor reaction forces determined in correspondence with Fig. 15 and Fig. 16 are used as substitutes. For comparison with the embodiment, the average errors of the joint moments determined by the technique of the aforesaid pure three-dimensional form are shown by dashed lines.